CHAPTER 9
ALTERNATIVE ANALYSIS APPROACH/RECOMMENDED ACTIONS

Introduction

This chapter presents a description of all structural and nonstructural alternatives that were identified as potential ways to reduce flooding impacts in the Chehalis River basin. The chapter includes recommendations for alternatives that the Flood Authority has selected and describes the process the Flood Authority will use for selecting projects in the future.

The flood mitigation alternatives presented in this chapter were identified in a number of ways. First, project lists were compiled from existing Comprehensive Flood Hazard Management Plans for jurisdictions within the Chehalis basin. Second, the public was asked to recommend projects at the public workshops held in February 2009. The Flood Authority also requested project recommendations from member jurisdictions and others.

Flood mitigation strategies for the Chehalis River basin are classified in three categories:

- Major regional capital projects,
- Local capital projects, and
- Nonstructural programmatic actions.

The sections below describe the potential projects that have been recommended in each category and identify which are being recommended at this point in the Draft Plan process.

Selection Criteria and Ranking Process

The Flood Authority began developing its process for ranking projects at its May 2009 work session. At that meeting the Flood Authority reviewed draft project considerations and discussed a system for ranking projects. The Flood Authority will continue to develop the process at its June work session and this chapter will be revised following that meeting.

Draft Project Considerations

The Flood Authority reviewed and commented on draft considerations for evaluating projects at the May 2009 work session. Those considerations have been revised and are presented here.

- **Definition of the Project.** Has the project been sufficiently defined and scoped to be considered and evaluated as a potential project by the Flood Authority? What is the intent of the project? Who will benefit?

- **Implementing Agency**. Is there an identified agency or jurisdiction who will take the lead on the project? Is there an identified agency or jurisdiction who will be in charge of maintenance on the project?
- **Ability to Meet Goals**. Does the project meet the goals outlined in the Chehalis River Basin Comprehensive Flood Hazard Management Plan?
- **Effectiveness of Mitigation.** What flood hazard problems does the project solve? Is it a permanent or temporary solution? Is it a complete or partial solution? How much of the basin would be affected? Does the project consider upstream and downstream effects?
- **Feasibility**. Are there technical obstacles that would prevent the project being constructed?
- **Cost and Funding Sources**. How expensive is the project and who will bear the cost? Are funding sources available, both in the short-term and long-term?
- **Cost-effectiveness**. How much benefit does the project deliver per dollar invested?
- **Environmental Impacts**. Does the project have significant environmental impacts or can adverse impacts be mitigated?
- **Permitting Ease**. What approvals or permits will be required? Are those approvals or permits likely to be granted?
- **Timeliness**. How long will it take to implement the project? Are there other projects that must be completed before this project can begin?
- **Acceptability**. Is the project acceptable to the stakeholders in the Chehalis basin?

Ranking Process

The Flood Authority proposes to evaluate and rank potential projects using the draft considerations. The draft considerations will be developed into a numerical, weighted ranking system. The ranking system will be presented in the next version of this chapter.

Major Regional Capital Projects

Major regional capital projects are those projects that would address flood issues on a broad or regional basis. These include projects such as levee construction, flood storage, and dam modifications. Several major regional capital projects have been recommended for the Chehalis River basin and some of those projects are currently being studied. However, the projects are not yet ready for implementation. These projects are described in Table 9-1. The Flood Authority has decided to fund studies that will support decision-making on these major regional projects as part of its Nonstructural Programmatic Actions described below.

Table 9-1. Major Regional Capital Projects

Project Name	Proposer	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Twin Cities Project	Corps of Engineers	Centralia and Chehalis, Skookumchuck River, with impacts downstream	A series of levees in Centralia and Chehalis. Potential modifications to the Skookumchuck dam.	Flooding in the Twin Cities and vicinity. Flooding of I-5 near Chehalis.		Corps of Engineers	Design complete in Nov. 2011. Construction begins Oct. 2013, ends in 2020.		Refined cost estimate will be available in January 2010 at 35% design	WRDA bill, Flood Authority state funding authority as local match
Upstream Storage	Lewis County PUD	Upstream on the Chehalis River and South Fork, with benefits downstream	Two dams, one on the Upper Chehalis and one on the South Fork Chehalis.	Flooding downstream of the dams.		Lewis County PUD			$336 million	Potential for federal funding
Skookumchuck Dam Modifications	TransAlta	Skookumchuck River, with impacts in Chehalis and downstream	Modify the Skookumchuck Dam to allow increased release of water and therefore increased capacity for flood storage	Flooding downstream of the Skookumchuck Dam		TransAlta and Flood Authority				Flood Authority, grants, or the Twin Cities project.
Other Storage Options	Authority	Entire Basin	Examine the potential for flood storage throughout the basin and the potential flood benefits from each.	Reduction in flood peaks downstream of the dams.		Authority or Corps.				Authority or possibly the Corps GI.

Several of the studies the Flood Authority has chosen to fund relate to a specific major regional capital project. These studies, such as the Upstream Storage Feasibility Phase II Analysis and the Skookumchuck Dam Modification Feasibility Analysis, will develop the information necessary to answer to the Flood Authority's project considerations. Though not funded by the Flood Authority, completion of 35 percent design for the Twin Cities project will fill a similar role for that project. Other funded studies, such as the HEC-RAS hydraulic model and the Ecosystem Services analysis, will provide information necessary to evaluate all major regional capital projects. Once these studies are complete, the Flood Authority will be able to use its established project considerations and ranking process to make decisions about which projects to support. This process is detailed in Figure 9-1. See Figure 9-2 for a timeline of estimated completion dates for studies and other efforts related to decision-making on major regional capital projects.

Figure 9-1. Process for Gathering Information and Making Decisions on Major Regional Projects

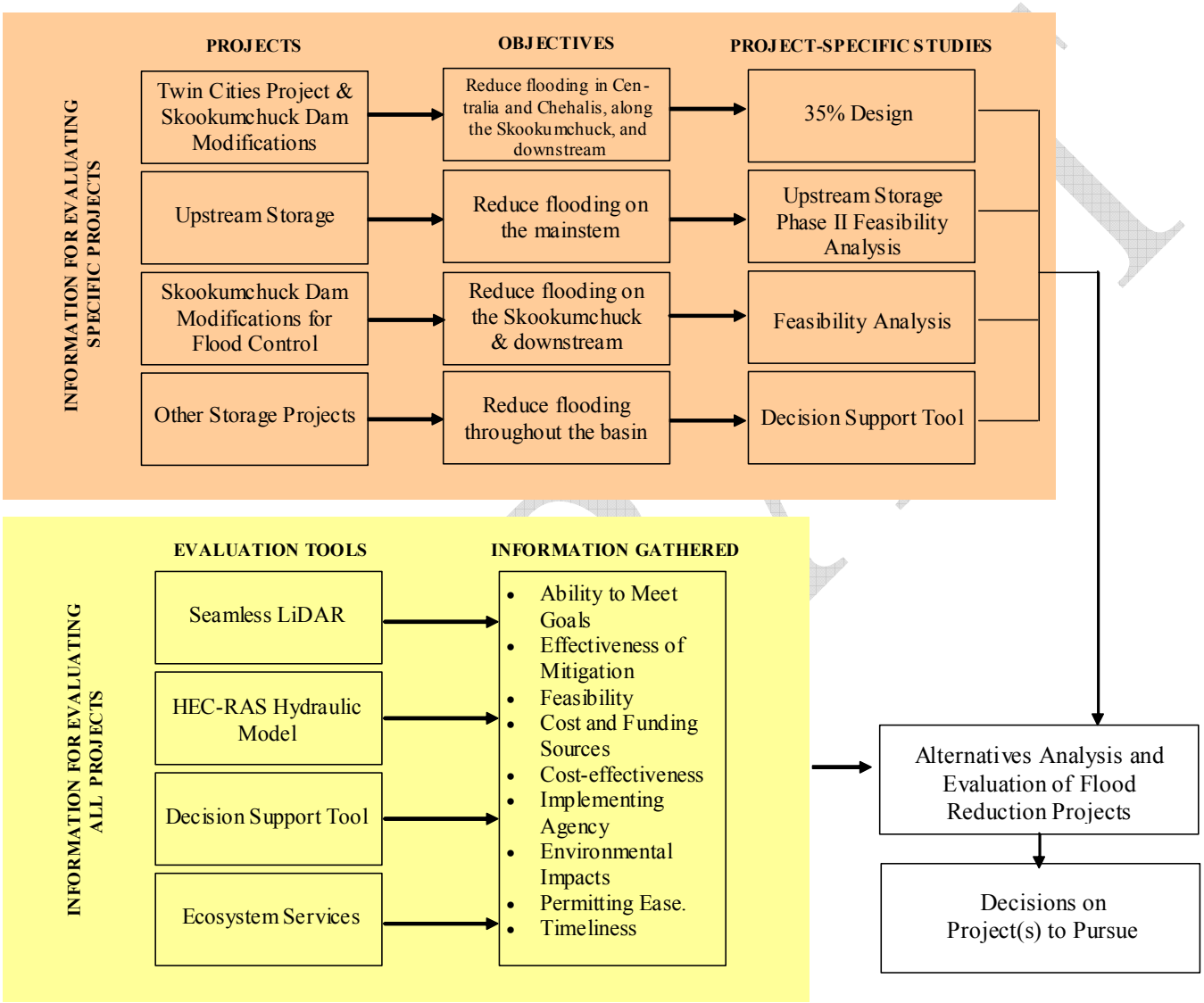
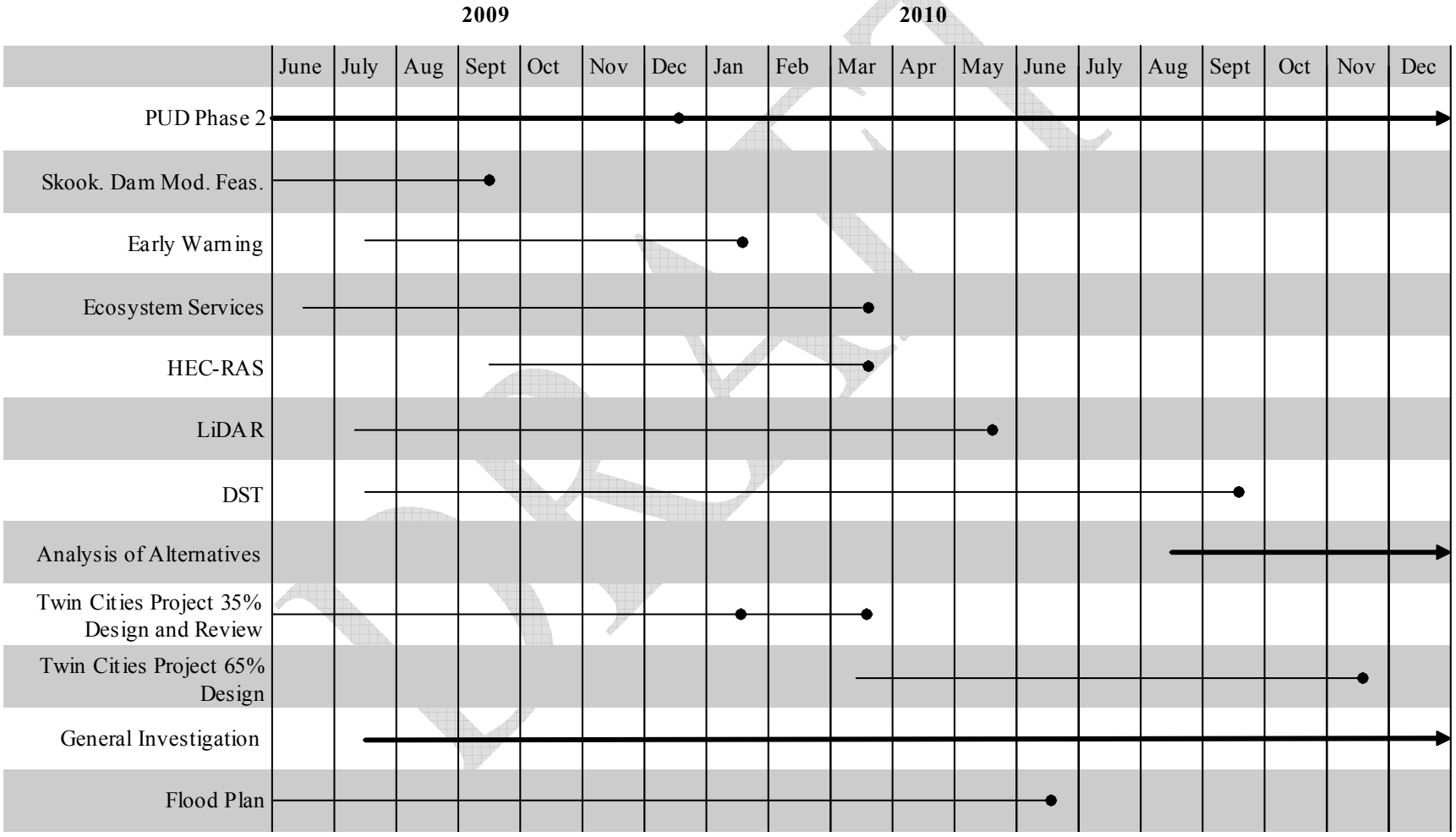


Figure 9-2. Timeline of Flood Authority and Related Studies and Analyses



Local Capital Projects

Local capital projects are ones that address specific, local flood problems. Many of the projects identified in existing Comprehensive Flood Hazard Management Plans for jurisdictions in the basin fall into this category. Local capital projects are described in Table 9-2. Most of these projects are ones that could most appropriately be undertaken by local jurisdictions. However, it might be appropriate for the Flood Authority to support some of these projects either through direct funding or by providing match money for grants.

Because the local capital projects are different in scale than major regional projects, the Flood Authority would apply a different ranking system to evaluate them. The Flood Authority discussed draft considerations, listed below, for evaluating local projects at its May 2009 work session. These considerations will be revised at the June 2009 work session and included in the next version of this chapter.

The Flood Authority should consider supporting local capital projects that:

- Address the general project considerations,
- Can be implemented at a relatively low cost,
- Can be accomplished in the next year or two,
- Provide relief from flood damage,
- Are potentially eligible for funding partnerships in the near future,
- May not have other funding sources,
- Provide an immediate benefit,
- Do not adversely affect others, and
- Will not preclude any future actions.

Table 9-2. Local Capital Projects

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Salzer Creek backwater control	Lewis County and Chehalis CFHMP	Floodplain Protection									
Provide increased on-site detention and retention	Grays Harbor County CFHMP	Floodplain Protection									
Build an overtopping levee at the north end of town	Bucoda CFHMP	Floodplain Protection	Within the town of Bucoda								
Install twin 18-inch culverts under Main Street at 11th	Bucoda CFHMP	Floodplain Protection	Within the town of Bucoda								
Relief Culvert for North Side Runoff	Oakville	Floodplain Protection	Within the city of Oakville	Improve, and lengthen, the drainage system that transports the runoff from the north side of the city in the south side. Install new drainage inlets along near the railroad track and improve the existing system that carries the stormwater to the south side of the city.	Presently this runoff flows east, along the north side of Highway 12, and flows under the Highway just east of the city limits. This runoff eventually overwhelms the Highway ditch and starts flooding the surrounding area. This flooding has occurred more frequent within the last several years and is starting to inundate local roads and damage homes. Installation of this culvert will reroute the runoff to the west side of State Street, which acts like a natural levee, and should reduce the impact of the stormwater flooding on the public.		City of Oakville		Easement for culvert under railroad tracks Easement for crossing of State highway (US12)		
Harris Creek Fish Enhancement	Oakville	Floodplain Protection	Within the city of Oakville	Replace the existing culvert under State Street, at Harris Creek, and replace them with a three-sided structure.	This project would allow for high flows to pass under State Street and reduce the possible of flooding. During the last two winters water has overtopped the roadway in this location cutting off emergency access to a number of residents.	None	City of Oakville & Chehalis Indian Tribe	Summer 2009 or 2010, fish window	Corps of Engineer Permit, HPA, Shoreline exemption	$330,000, estimate done in 2009	

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Sickman-Ford Bridge Culvert	Oakville	Floodplain Protection	Within the City of Oakville	Install four three-sided structures in the northerly approach to the Sickman-Ford Bridge	This project would help reduce the hydraulic gradient that is evident during high water events. This gradient causes severe flooding in both the Black River Basin as well as the Chehalis Basin	None	City of Oakville and Chehalis Indian Tribe	Summer of 2010	Corps of Engineers Permit, HPA, Shoreline exemption	$624,454, estimate done in 2009	Basin wide flood control
River braiding	Grays Harbor at 2/19 workshop	Floodplain Protection	Wynoochee and Satsop rivers	Open old migration channels							
Culvert projects on Hiram Hill	Grays Harbor at 2/19 workshop	Floodplain Protection	Hiram Hill in Grays Harbor County								
Montesano WWTP	Montesano at 2/19 workshop	Floodplain Protection	Montesano	Raise the height of dikes around, or otherwise protect, the Montesano WWTP							
Adna Levee Improvement	Corps of Engineers	Floodplain Protection	Adna	The Adna levee is a railroad grade that does not currently function as a flood protection levee. This project would improve the railroad grade to provide flood control. To become a flood control structure, the following improvements must be made: A. Determine a public sponsor and acquire easements; B. Add interior drainage; C. Clear the embankment of overgrown vegetation and develop an annual vegetation maintenance program; D. The slope must be repaired to a minimum 2H:1V slope; E. Additional post flood repair work including grading, slope work and crown work Once these improvements have been made, the structure will be eligible for the PL 84-99 program if a sponsor can be found.	The structure is not currently considered a levee. It impounds water on the landward side, and in significant events, overtops and/or breaches, introducing damaging flows to the Adna community. Additional data is required to determine the storm frequency that impounds flow and whether flow is from rain events and/or a result of overbank flow upstream. This railroad grade could potentially be turned into an effective flood control system.		Corps of Engineers				Section 205 could provide a source of funding. The Corps of Engineers needs a nonfederal sponsor to initiate a study under Section 205 and neither the Flood Authority nor Adna qualify. Potential sponsors are the State of Washington or Lewis County. Alternately, the Town of Adna could form a diking district to serve as sponsor.

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Develop a technical assistance program for bank stabilization and/or debris removal	Lewis County CFHMP	Bank Protection	Basin-wide.								
Incorporate biostabilization and other engineered solutions to stabilize banks	Grays Harbor County CFHMP	Bank Protection	Basin-wide.								
Provide long-term stabilization of the Wynoochee River banks to protect City sewage facilities	Montesano CFHMP	Bank Protection	Montesano.								
Streambank Stabilization	Bucoda CFHMP	Bank Protection									
Mary's River Lumber bank protection	Montesano at 2/19 workshop	Bank Protection	¼-mile of Chehalis River in Montesano	Steel plate protection or rip-rap protection						Approx. $1 million	
Independence Road Bank Protection Project	Thurston County	Bank Protection	Independence Road between Michigan Hill and 201st Street in Thurston County.	Feasibility Study to realign Independence Road between Michigan Hill Road and south of 201st Street and buy private properties impacted by loss of access. The realignment would be put of the flood plain and the active channel meander zone of the Chehalis River.	The project would eliminate the loss of public access on this section of Independence Road, which is subject to erosion from river channel migration. Also the flooding of adjacent residents would be eliminated if the project included purchase of property and access rights.	The alternative is to continue to address Chehalis River migration and related loss of Independence Road through bank stabilization and required mitigation of associated environmental impacts.	Thurston County Public Works	2015	Many+	$1 million (very preliminary cost estimate)	?
Open Migration Zone of the Satsop	Grays Harbor at 2/19 workshop	Conveyance Capacity	Satsop River	Remove or mitigate man-made obstacles in the Satsop River							
Dredge Lake Sylvia	Montesano at 2/19 workshop	Conveyance Capacity	Lake Sylvia, behind the (Wynoochee?) dam								

Nonstructural Programmatic Actions

Nonstructural programmatic actions are projects that attempt to prevent or reduce flood damage through nonstructural means. Typical programmatic actions include:

- Regulatory programs,
- Planning and data collection,
- Education and public information,
- Emergency response,
- Reducing damage to existing structures,
- Natural resource protect, and
- Forest practices.

Table 9-3 describes the nonstructural programmatic actions that have been identified in the Chehalis basin. The actions in the table are classified by the categories above.

Table 9-3. Programmatic Actions

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Develop floodplain conservation easement program	Grays Harbor County CFHMP	Regulatory Programs	Basin-wide.								
Improve floodplain and stormwater regulations	Centralia CFHMP	Regulatory Programs	Centralia.								
Tax breaks	Grays Harbor at 2/19 workshop	Regulatory Programs	Entire basin	Give tax breaks to people who remove structures and fill from the floodplain							
Penalization	Chehalis Tribe at 2/19 workshop	Regulatory Programs	Entire basin	Penalize people who build or fill in the floodplain							
Channel Migration Zone Mapping	Lewis County	Planning and Data Collection - Mapping/ Modeling (Local)									
Channel Migration Zone Mapping	Centralia	Planning and Data Collection - Mapping/ Modeling (Local)									
Channel migration analysis	Chehalis Tribe	Planning and Data Collection - Mapping/ Modeling (Local)		Conduct a channel migration analysis for the Chehalis River form the city of Centralia to the Grays Harbor County line							
Comprehensive Flood Plan Augmentation	Chehalis Tribe	Planning and Data Collection - Mapping/ Modeling (Local)		Augment the Chehalis Tribe Comprehensive Flood Plan with 2-, 5-, and 10-year recurrence interval flood surface maps.							
Survey of river cross-sections	Public comment	Planning and Data Collection - Mapping/ Modeling (Regional)									
Remap floodplains	Thurston County	Planning and Data Collection - Mapping/ Modeling (Regional)		Remap floodplains using new 2-foot contour data for all rivers; submit changes to FEMA for map revisions							

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Berwick Creek Drainage Plan	Lewis County and Chehalis	Planning and Data Collection - Plans (Local)									
China Creek Drainage Plan	Lewis County and Chehalis	Planning and Data Collection - Plans (Local)									
Rochester Stormwater Plan	Thurston County	Planning and Data Collection - Plans (Local)									
Revise Thurston County's Comprehensive Flood Hazard Management Plan	Thurston County	Planning and Data Collection - Plans (Local)									
Revise Town of Bucoda's Comprehensive Flood Hazard Management Plan	Bucoda	Planning and Data Collection - Plans (Local)									
Reevaluate land uses and zoning based on the new floodplain maps	Thurston County	Planning and Data Collection - Plans (Regional)									
Study of woody debris and aggregates	Grays Harbor County	Planning and Data Collection - Plans (Regional)									
Evaluate channel response to sediment	Chehalis Tribe	Planning and Data Collection - Studies (local)		Evaluate river channel responses to influx and deposition of sediment in the vicinity of the Chehalis Reservation							
Study of failed riprap	Chehalis Tribe	Planning and Data Collection - Studies (local)		Conduct a study to determine volume, placement, and potential impacts of flood on failed riprap placed by Thurston County on the Chehalis River bank adjacent to Independence Road							
Study of proposed mitigation strategies	Chehalis Tribe	Planning and Data Collection - Studies (local)		Identify and conduct studies that would need to be accomplished in order to design the proposed mitigation strategies (such as raising Moon Road)							

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Investigate conditions near Wickett levee	Chehalis Tribe	Planning and Data Collection - Studies (local)		Investigate local conditions in the vicinity of the pushup levee near Wickett properties to assess site specific and downstream impacts during flooding							
Study of water backup over HWY 6	Public comment	Planning and Data Collection - Studies (local)		Determine what is causing water backup over Highway 6							
Study of fill adjacent to Harris Creek	Chehalis Tribe	Planning and Data Collection - Studies (local)		Conduct a study to determine the type and volume of fill adjacent to Harris Creek and evaluate if it would be beneficial to remove the fill							
Independence Road Bank Realignment Feasibility Study	Thurston County	Planning and Data Collection - Studies (local)		Feasibility Study – Independence Road Bank Realignment out of Flood Plain							
Skookumchuck River scour potential study	Thurston County	Planning and Data Collection - Studies (local)		Skookumchuck River scour potential with dam modifications							
Dynamic model of middle basin	Chehalis Tribe	Planning and Data Collection - Studies (local)		Coordinate with the Flood Authority to develop a dynamic model of the middle basin to assess effects of future basin development on the flood hydrology at the Chehalis Reservation							
2-D flow model	Chehalis Tribe	Planning and Data Collection - Studies (local)		Construct a two-dimensional flow model for the floodplain with Chehalis Reservation boundaries							
Sickman-Ford Bridge Approach	Chehalis Tribe	Planning and Data Collection - Studies (local)		Model the effects of removing/modifying the Sickman-Ford bridge approach and Balch Road							
Cumulative downstream flood impact analysis	Chehalis Tribe	Planning and Data Collection - Studies (regional)		Conduct a detailed cumulative downstream flood impacts analysis							
Monitoring program on channel conditions and dimensions	Chehalis Tribe	Planning and Data Collection - Studies (regional)		Develop a semi-annual monitoring program focused on documenting changes in Chehalis River channel conditions and dimensions							

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Study of impact of recent trucking and warehouse facilities	Public comment	Planning and Data Collection - Studies (regional)		Study the surface water and runoff impact of recent large trucking and warehouse facilities built in the Basin							
Study of groundwater flooding	Public comment	Planning and Data Collection - Studies (regional)		Study how groundwater flooding impacts flood events							
Study groundwater/surface water interaction	Grays Harbor at 2/19 workshop	Planning and Data Collection - Studies (regional)									
Inventory high quality riparian habitat along river reaches	Thurston County	Planning and Data Collection - Studies (regional)									
FloodPath Warning Model	USGS/ FEMA	Planning and Data Collection - Studies (regional)									
Floodplain Property Acquisition Program	Lewis County Public Works	Planning and Data Collection - Studies (regional)									
Identification of grant opportunities	ESA Adolfson	Planning and Data Collection - Studies (regional)									
Provide educational materials on flood hazard management	Grays Harbor County CFHMP	Education and Public Information	Basin-wide.								
Provide floodproofing guidance to residents	Grays Harbor County CFHMP	Education and Public Information	Basin-wide.								
Flood Awareness Week	Thurston County	Education and Public Information	Entire basin								
Flood District Formation	Proposed at 2/19 workshop	Governance and Management	Entire basin	Develop a Flood Control District for the entire watershed to plan and implement projects throughout the basin.							
Flood Warning Systems	Lewis County CFHMP	Emergency Response & Preparedness		Evaluate opportunities for flood warning systems							

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Flood Hazard Warning Policies	Grays Harbor County CFHMP	Emergency Response & Preparedness		Establish policies to ensure that flood hazard warnings are posted during flood events and that flood elevation poles are placed near rivers to show high water marks from previous floods							
Gauges	Grays Harbor County CFHMP	Emergency Response & Preparedness		Install new gauges and upgrade existing gauges. Install flow gauge on Humptulips River. Install stage gauges on the Satsop River, Chehalis River at the Harbor, and Upper Humptulips River							
City Hall Generator	Montesano CFHMP	Emergency Response & Preparedness		Install generator at City Hall for Emergency Operations Center							
Drinking water reservoir	Montesano CFHMP	Emergency Response & Preparedness		Construct drinking water reservoir on city property							
Improve flood notification and response program	Bucoda CFHMP	Emergency Response & Preparedness									
Develop and maintain a specific flood warning and evaluation program for the city	Centralia CFHMP	Emergency Response & Preparedness									
Manage Wynoochee and Skookumchuck dams for flood control	Grays Harbor and TransAlta at 2/19 workshop	Emergency Response & Preparedness	Wynoochee and Skookumchuck dams								
Generator at Grays Harbor Fairgournds	Grays Harbor at 2/19 workshop	Emergency Response & Preparedness	Grays Harbor Fairgrounds		Grays Harbor Fairgrounds serves as an evacuation site. It typically loses power in flood events.						

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Address loss of power and cell phone coverage	Lewis County at 2/19 workshop	Emergency Response & Preparedness	Entire basin								
Critter pads	Lewis County at 2/19 workshop	Emergency Response & Preparedness			Addresses livestock loss						
Join the NFIP Community Rating System	Grays Harbor County CFHMP	Reduction of Damage to Existing Structures	All communities.		Reduces cost of flood insurance.						
Develop a home elevation and buyout program	Grays Harbor County CFHMP	Reduction of Damage to Existing Structures	Basin-wide.		Eliminates damages to structures.						
Regrade Main Street	Bucoda CFHMP	Reduction of Damage to Existing Structures	Bucoda								
Raise houses	Bucoda CFHMP	Reduction of Damage to Existing Structures	Duplicated.								
Participate in NFIP Community Rating System	Centralia CFHMP	Reduction of Damage to Existing Structures	Duplicated.								
Moon Road / Easton 188th Roadway Raise in Elevation	Thurston County	Reduction of Damage to Existing Structures		Raise the elevation of the lower spots along Moon Road south of State Route 12 and the east end of 188th Ave SW. This project is in the Draft CFHMP for the Confederated Tribes of the Chehalis Reservation. Thurston County's understanding to date is that the elevation change would be on only the existing lower spots that food frequently. The raise in elevation would not be like the larger project that was accomplished on parallel Anderson Road. Some form of culverts may also be needed.	Frequent flooding of the most direct access to the easterly end of the Confederated Tribes of the Chehalis Reservation including the Lucky Eagle Casino and motel.	This project is in the Draft Comprehensive Flood Management Plan for the Confederated Tribes of the Chehalis Reservation.	Confederated Tribes of the Chehalis Reservation/Thurston County	Thurston County Six Year Transportation program needs to be amended to include this project. The priority of the county still needs to be established.	SEPA, Shorelines and Tribal Permits	Unknown	Unknown

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Elevating homes in the Chehalis Basin	Thurston County	Reduction of Damage to Existing Structures	Thurston County (potentially Entire basin) Duplicated.	Elevating homes in the Chehalis Basin. This may also include the Skookumchuck and Black River flood plains that are part of the Chehalis Basin.	Flooded private residents and commercial improvements.		Thurston County			Unknown	Unknown
Lincoln Creek Floodplain Purchase	Lewis County	Reduction of Damage to Existing Structures	Lincoln Creek Road area between Cooks Hill and Matson Roads	Purchase properties to reduce safety impacts, provide floodplain storage, reduce long-term flood related financial impacts to the county, use as wetland banking, avoid the public subsidy of private development, and protect emergency responders from flood related hazards.	Generally, land development in floodplains place obstructions to flood flow paths, which takes a toll on county roads. The impacts to county road maintenance is manifested in the following ways: 1. More frequent repairs of eroding embankments, road surfaces, and culverts. 2. Need to clear and monitor debris from culverts and bridges during heavy storms and high flow events. 3. Upsize culverts and bridges to handle unmitigated, higher flows. 4. Closure and monitor of inundated roadways. Strategic purchase of floodplains will also help the waning of floodwaters, thus allowing access to public roads. Another benefit of this project is emergency response. By keeping passage open, access is provided for emergency vehicles and for evacuation.	The properties have great potential for wetland banking to mitigate for the impacts from new county road construction, and for a countywide recreational trail. Other uses are to lease the properties for seasonal farming or grazing. This project meets all eight goals of Lewis County's CFHMP, which was approved in September 2008.	Lewis County Public Works.	If project is wholly funded, it can begin immediately.	Demolition permits.	$350,000 for minimal area, and $500,000 for a larger area.	Chehalis River Basin Flood Authority PW Road Fund

Project Name	Proposer	Category	Geographic Area	Project Description	Problems Mitigated	Alternatives Examined	Proposed Implementer	Schedule for Implementation	Permit Issues	Estimated Cost	Potential Funding Sources
Floodplain Property Acquisition Project	Lewis County	Reduction of Damage to Existing Structures	Entire basin Duplicated	A project to acquire property in the floodplain. The project would include developed criteria to determine feasibility, priority, and value of potential properties							
Protect access to Satsop Development Park	Grays Harbor County	Reduction of Damage to Existing Structures	Grays Harbor County								
Protect and restore critical areas	Centralia CFHMP	Natural Resource Protection									
Provide habitat for wildlife and fish	Centralia CFHMP	Natural Resource Protection									
Camp Creek drainage improvements	Montesano & Grays Harbor at 2/19 workshop	Natural Resource Protection									

The Flood Authority has approved an approach for considering regulatory approaches to flood control and has agreed to fund several planning and data collection projects through its Ripe and Ready Studies program. These are described in the following sections. The Flood Authority will evaluate other nonstructural programmatic actions in the next stage of its flood planning process.

Consideration of Regulatory Approaches

In response to concerns and questions about development impacts on flooding and the adequacy of existing local regulations, the Flood Authority agreed to evaluate existing regulations in the basin. At its May 2009 work session, the Flood Authority discussed an approach to considering regulatory programs. The purpose of the project is to make recommendations for improvements to regulatory programs in the basin. The approach for the project is presented below.

The Flood Authority will authorize a Work Group consisting of the Board Advisory Committee and representatives from the basin jurisdictions' planning and building departments to develop findings and options for building and land use regulations to achieve flood damage reduction. This Work Group will undertake the following steps:

- Evaluate regulatory approaches to development in the floodplain from the perspective of:
    - Risk to proposed structures,
    - Risk to existing structures and properties,
    - Ecological risks (including habitat, water quality, and wetland impacts), and
    - Emergency management costs.
- Review local jurisdictions options for credit from the Community Rating System (CRS) to reduce flood insurance premiums under Activity 430, Higher Regulatory Standards.
- Develop findings and options for presentation to the Flood Authority, including:
    - Best management practices and model regulations for local jurisdictions to consider, and
    - Pros and cons of various practices and approaches.

The Flood Authority will use these findings to develop a recommended set of consistent best land use practices and regulations to achieve flood damage protection and reduction.

If approved at the June 2009 Flood Authority meeting, this project is scheduled to begin in July 2009.

Ripe and Ready Studies

An early interest of the Flood Authority was implementing some flood risk reduction projects as soon as possible. These projects were identified as ones that could provide an immediate benefit, would not adversely affect others, and would not preclude any future actions. These have been referred to as "ripe and ready" projects. Under the category of ripe and ready studies, the Flood Authority has chosen to support a number of studies that would support decision-making on major capital projects in the basin.

Table 9-4 summarizes the ripe and ready studies being pursued by the Flood Authority.

Table 9-4 Ripe and Ready Studies

Study	Update
PUD Flood Storage Phase 2	The Flood Authority has contributed funding for Phase II studies of upstream storage.
Skookumchuck Dam Modification Feasibility	TransAlta is studying alternatives and analyzing the feasibility of modifying the discharge system of the Skookumchuck Dam to allow for faster drawdown and more effective use of the facility for flood control.
Early Warning Program	The Flood Authority has studied the existing precipitation and stream gauge system in the basin and solicited recommendations for new gauges. The Flood Authority is in the process of releasing a Request for Qualifications for a firm to design an improved flood warning system for the basin.
Ecosystem Services	This project will provide an analysis and valuation of flood protection and other ecosystem services in the Chehalis Watershed. The Flood Authority is expected to approve the contract with Earth Economics in June 2009.
Lower-basin Hydraulic Model	This project would produce a calibrated 1D hydraulic model for the lower basin, similar to the existing unsteady HEC-RAS model used by Northwest Hydraulic Consultants **(nhc)** and the Corps for the upper basin. The Flood Authority is coordinating with FEMA on potential partnership.
Seamless LiDAR	Light Detection and Ranging (LIDAR) data exist for some, but not all of the basin. This project would acquire a seamless LIDAR surface of the entire basin. The Flood Authority is coordinating with Puget Sound LIDAR Consortium to acquire this data.
Decision Support Tool (DST)	The Decision Support Tool (DST) is a USGS calibrated rainfall-runoff model for gauged and ungauged streams throughout the basin. The Flood Authority is reviewing a scope of work for the project.